Shoe

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The invention relates to a shoe, especially a sports shoe, with a sole and a shoe upper part connected thereto, the sole having a receiving space, in which a damping element can be detachably arranged.

A shoe of this kind is known from DE 102 31 882 A1, for example. The sports shoe described there has a sole, in which a damping system is arranged, which has a spring element. The spring element is designed in the style of a linear slotted spring; it can also be designed as a disk spring or cup spring.

EP 0 387 505 B1 describes a shoe, especially a sports shoe or rehabilitation shoe, with a shoe sole with at least one insert part consisting of a honeycomb body. Insertion of the insert part into a heel wedge of the sole or into another sole part, for example into the intermediate sole, can be carried out from the side by pushing it into a slot or into a corresponding lateral opening. The slot or the lateral opening can be closed toward the outside by a cover plate or with a cover strip. The sole therefore has a receiving space for an insert part, which can be interchangeable. The insert part itself consists of a number of gas-filled honeycomb cells, so that advantageous spring and damping action of the

sole is brought about.

Sports shoes, the soles of which are likewise provided with a receiving space in which a damping element can be arranged, are known from DE 29 04 540 A1, DE 29 22 136 A1, DE 30 29 258 A1 and DE 34 30 845 A1. This receiving space is in the form of bores extending horizontally through the sole transversely to the longitudinal axis of the shoe, into which plastic pins of different hardness can be inserted in order to influence the spring and damping characteristics of the sole.

Shoes of a similar kind are known from DE 39 24 360 A1, DE 88 08 608 U1, US 2003/02 17 483, EP 0 375 306 A2, EP 0 146 846 A1, WO 03/045179 A2, WO 03/026453 A2 and JP 09 140406 A.

In the light of these previously known developments of a shoe, especially a sports shoe, the object of the invention is to improve further the spring and damping action of the shoe and in particular of the shoe sole and to make it adjustable in such a way that the shoe can be equipped with a desired spring and damping action in an optimum way. In this connection, it is to be possible in particular to influence the pronation or supination action of the shoe or the shoe sole specifically and to make it adaptable to individual needs or wishes.

The solution according to the invention for achieving this object is characterized in that the receiving space extends substantially or completely through the sole transversely to the longitudinal axis of the shoe and in that the detachably arranged damping element consists of a basic body of plate-like design, which has a number of recesses in which damping parts can be arranged, the recesses in the damping element extending over the entire height of the damping element in the vertical direction.

By virtue of this, a receiving space for the damping element is produced, into which the damping element can be pushed transversely to the longitudinal axis of the shoe.

In particular, it is proposed that the individual damping parts for arrangement in the recesses are selected in such a way that the shoe or its sole has a desired spring and damping action and/or a desired pronation or supination action.

The invention is therefore based on designing the damping element with a plate shape and providing it with a number of damping parts, the material properties of which are selected in such a way that the spring and damping characteristics of the shoe sole overall but also with regard to the spring stiffness about the longitudinal axis of the shoe can be

actively influenced. By influencing the spring stiffness about the longitudinal axis of the shoe, the pronation or supination action of the sole can be specifically influenced and adapted to individual needs.

A development proposes that the receiving space in the sole is arranged in the heel region.

In this connection, the recesses can - seen in the vertical direction - have a hexagonal shape. Furthermore, the recesses and accordingly the damping parts can - seen at right angles to the vertical direction - have a conical shape.

A preferred development of the invention proposes arranging a central recess for receiving a central damping part in the damping element and providing a number of further recesses, in particular six, for receiving further damping parts around the central recess, the further recesses being arranged on a circular path around the center of the central recess. In this connection, the further recesses are preferably arranged equidistantly over the circumference of the circular path.

The height of the basic body - measured in the vertical direction - is preferably between 0.3 and 2.0 cm, in particular between 0.5 and 1.0 cm.

The basic body and/or the damping parts are advantageously made of plastic, in particular of thermoplastic material; in this connection, polyamide, polyurethane, polyethylene, polypropylene, polybutane, polyolefin, ethylene-vinylacetate, polyvinyl chloride or a mixture of at least two of these plastics is preferably provided. In this connection, the plastic material is foamed according to a development.

The material of the basic body and/or of the damping parts preferably has a greater hardness than the material of the sole. In this connection, the plastic of the basic body and the damping parts can have a Shore hardness of between 25A and 45A. In particular, the plastic of the basic body has a lower hardness than that of the damping parts.

To improve verification of the adjusted spring and damping characteristic, the material of the sole is translucent or transparent in the region of the basic body and/or of the damping parts.

In order that the damping element is secured in mounted position, a retaining element can furthermore be provided, which fixes the basic body in its position of being arranged in the receiving space. The retaining element can be of stirrup-shaped design and grip around the sole from below. Both the sole and the basic body can have recesses for

positive interaction with the retaining element.

The sole can consist of an intermediate sole and an outsole connected thereto, and the damping element can be arranged in the intermediate sole.

The shoe according to the invention can comprise a system consisting of a number of damping parts of different hardness provided for optional interchange, which can be arranged in the recesses of the basic body. In this connection, each degree of hardness of the damping part is advantageously assigned a defined color, with which the damping parts are dyed at least on their outer surface. Rapid and simple selection of the desired damping parts can thus take place in order to adapt the shoe to individual needs.

With the development according to the invention of a shoe, especially a sports shoe, it is possible to adapt the spring and damping action of the shoe sole and also the pronation and supination action of the sole to individual needs or requirements. Adaptation can take place rapidly and simply, so that the shoe can be adapted optimally to the desired characteristics.

An illustrative embodiment of the invention is shown in the drawing, in which

Fig. 1 shows a perspective view of a sports shoe with the damping element removed;

Fig. 2 shows the damping element according to the section A-B (see Fig. 1), and

Fig. 3 shows the rear part of the sports shoe illustrated in perspective with the damping element inserted and the retaining element mounted in a view of the shoe from below.

Fig. 1 shows a sketch of a sports shoe 1. The shoe has a sole 2, which is connected in the usual way to a shoe upper part 3. The sole 2 is sketched in one piece. As a rule, however, it consists of a number of part elements, for example of an intermediate sole, on the underside of which an abrasion resistant outsole is arranged.

The sole 2 is provided with a damping element 5 in order for it to be possible to adjust the spring and damping action of the shoe 1 to individual needs. In this connection, the damping element 5 is introduced, that is pushed, into a receiving space 4, which extends over a certain extent along the longitudinal axis L of the shoe 1 and through the sole 2 transversely to this direction. In the illustrative

embodiment, the receiving space 4 passes through the sole 2 completely, so that a space extending from the left to the right sole side is brought about. The extent of the receiving space 4 along the longitudinal axis L of the shoe 1 is selected in such a way that the damping element 5 lies between the metatarsus region and heel region.

The damping element 5 consists of a basic body 6 of plate-shaped design, which has a number of recesses 7. These extend over the entire height H of the basic body 6 or damping element 5, as can be seen in Fig. 2. Damping parts 8 are in each case inserted into the recesses 7. These damping parts 8 are made of plastic material with the desired hardness and stiffness.

As can be seen in Fig. 1, a central recess 7' is provided in the basic body 6, around which six further recesses 7'' are arranged equidistantly on a circular path. Each recess 7, 7', 7'' is provided with a damping part 8, 8', 8''.

The basic body 6 equipped with damping parts 8, 8', 8'' is pushed into the receiving space 4 in the insertion direction E (see Fig. 1). The spring and damping action of the sole 2 is determined by the selection of the material properties of the damping parts 8, 8', 8''.

In this connection, it may be mentioned that all the damping parts 8, 8', 8'' do not by any means have to be of the same kind. It is possible for the individual damping parts 8, 8', 8'', that is both the central damping part 8' and the individual further damping parts 8'', in each case to be selected from a "construction kit". It is thus possible for not only the spring and damping characteristic of the sole 2 overall to be adapted to individual wishes but also the pronation and supination action of the sole 2 to be adjusted. If, for example, harder damping parts 8 are used in one lateral region of the basic body 6 than in the other lateral region, a preferential spring deflection is brought about on the sole side with the lower hardness, or elasticity, which has a direct effect on the pronation or supination characteristic of the sole 2.

As can be seen looking at Figures 1 and 2 together, the individual damping parts 8, 8', 8'' - observed in the direction of the vertical V - can have a hexagonal basic shape but widen conically over the height; the corresponding shape of the recess 7, 7', 7'' is formed accordingly.

In order that the damping element 5 cannot come away in its state of being pushed into the sole 2, a retaining element 9 is provided, which is of stirrup-shaped design and grips around the sole 2 from below. The retaining element 9 can be

held on the sole 2 by a snap fastener (not illustrated in greater detail), for example.

Both the sole 2 and the basic body 6 of the damping element 5 have recesses 10 and 11 respectively in order to make positive interaction with the retaining element 9 possible. The recess 10 in the sole 2 extends in a groove-like way both in the lateral regions of the sole 2 and in the region facing the ground.

The shoe 1 can be offered as a system to which an appropriate number of damping parts 8 of different hardness and/or elasticity belong. The individual damping parts 8 can be dyed differently depending on their hardness, for example with different shades of gray.

To configure the shoe, the shoe wearer can make an appropriate selection of damping parts 8 with the desired hardness from the system. The damping parts 8 are then inserted into the recesses 7 in the basic body 6, and the damping element 5 thus prepared is pushed into the receiving space 4 and fixed there. The spring and damping action and also the pronation or supination action of the shoe 1 is thus individually set.

List of references

1	shoe
2	sole
3	shoe upper part
4	receiving space
5	damping element
6	basic body
7	recess
7′	central recess
7′′	further recess
8	damping part
8′	central damping part
8′′	further damping part
9	retaining element
10	recess
11	recess

L	longitudinal axis
H	height of damping element
V	vertical direction
E	insertion direction